Claims

[c1] 1.A method for assembling tile detectors for an imaging system, comprising the acts of:
bending a flexible panel to a curved shape;
coupling a plurality of detector tiles to the flexible panel in the curved shape; and
inversely bending the flexible panel to a desired shape to close gaps between the detector tiles.

[c2] 2.The method of claim 1, wherein the act of bending the flexible panel comprises the act of applying a fluid pressure to at least one side of the flexible panel.

[c3] 3.The method of claim 1, wherein the act of bending the flexible panel comprises the act of applying a gas pressure to at least one side of the flexible panel.

[c4] 4.The method of claim 1, wherein the act of bending the flexible panel comprises the act of applying a curved solid to at least one side of the flexible panel.

[c5] 5.The method of claim 1, wherein the act of bending the flexible panel comprises the act of supporting the flexible panel with a frame structure.

[c6] 6.The method of claim 1, wherein the act of coupling the plurality of detector tiles comprises the act of adhering ionizing photon detector tiles to the flexible panel in a tiled configuration.

[c7] 7.The method of claim 6, wherein the act of adhering ionizing photon detector tiles comprises the act of providing a Cadmium-Zinc-Telluride-based detector tile.

[c8] 8.The method of claim 6, wherein the act of adhering ionizing photon detector tiles comprises the act of providing a Cadmium-Telluride-based detector tile.

[c9] 9.The method of claim 1, wherein the act of coupling the plurality of detector

tiles comprises the act of picking and placing each of the detector tiles onto the flexible panel in an edge-to-edge configuration having an undesirable gap between edges of one or more adjacent pairs of the detector tiles.

[c10] 10.The method of claim 1, wherein the act of inversely bending the flexible panel comprises the act of releasing a bending force applied to the flexible panel.

[c11] 11.The method of claim 1, wherein the act of inversely bending the flexible panel comprises the act of relaxing the flexible panel to a flat shape.

[c12] 12.The method of claim 1, wherein the act of inversely bending the flexible panel comprises the act of partially relaxing the flexible panel to the desired shape, which has a relatively flatter curvature than the curved shape.

[c13] 13.The method of claim 1, comprising the act of forming the flexible panel by performing the acts of:
depositing a flexible material onto a wafer; and
removing an interior portion of the wafer to form a frame.

[c14] 14.The method of claim 1, comprising the act of providing each of the detector tiles as an ionizing photon detector tile intercoupled with a semiconductor wafer by intermediate connections.

[c15] 15.The method of claim 14, comprising the act of forming the intermediate connections using a plurality of solder bumps.

[c16] 16.The method of claim 1, comprising the act of attaching the plurality of detector tiles to a circuit board to form a multi-detector module.

[c17] 17.The method of claim 16, comprising the act of tiling a plurality of the multi-detector modules to a primary circuit board for the imaging system.

[c18] 18.The method of claim 1, comprising the act of interconnecting different detector layers using soldering materials having different melting temperatures.

[c19] 19.A method for assembling detector tiles for an imaging system, comprising the acts of:

coupling a plurality of detector tiles to a flexible OLE_LINK1panelOLE_LINK1;
bending the flexible panel to a desired curvature to close gaps between the detector tiles; and
fixing the detector tiles in the desired curvature.

[c20] 20.The method of claim 19, wherein the act of coupling the plurality of detector tiles comprises the act of adhering ionizing photon detector tiles to the flexible panel in a tiled configuration.

[c21] 21.The method of claim 20, wherein the act of adhering ionizing photon detector tiles comprises the act of providing a Cadmium-Zinc-Telluride-based detector tile.

[c22] 22.The method of claim 20, wherein the act of adhering ionizing photon detector tiles comprises the act of providing a Cadmium-Telluride-based detector tile.

[c23] 23.The method of claim 19, wherein the act of bending the flexible panel comprises the act of applying a fluid pressure to at least one side of the flexible panel.

[c24] 24.The method of claim 19, wherein the act of bending the flexible panel comprises the act of applying a gas pressure to at least one side of the flexible panel.

[c25] 25.The method of claim 19, wherein the act of bending the flexible panel comprises the act of applying a curved solid to at least one side of the flexible panel.

[c26] 26.The method of claim 19, wherein the act of fixing the detector tiles comprises the act of attaching the plurality of detector tiles to a circuit board to form a multi-detector module.

[c27] 27.The method of claim 26, comprising the act of tiling a plurality of the multi-detector modules to a primary circuit board for the imaging system.

[c28] 28.The method of claim 19, comprising the act of forming each of the detector

tiles as an ionizing photon detector tile intercoupled with a semiconductor wafer using intermediate solder bumps.

[c29] 29.The method of claim 19, comprising the act of interconnecting different detector layers using soldering materials having different melting temperatures.

[c30] 30.A method for assembling an imaging structure, comprising the acts of: soldering a first element of the imaging structure using a first material; and subsequently soldering a second element of the imaging structure using a second material having a lower melting point than the first material.

[c31] 31.The method of claim 30, wherein the acts of soldering the first element and subsequently soldering the second element comprise the act of assembling a multi-tile detector.

[c32] 32.The method of claim 30, wherein the acts of soldering the first element and subsequently soldering the second element comprise the act of electrically connecting multiple layers of a tiled imaging detector.

[c33] 33.The method of claim the 32, wherein at least one of the acts of soldering the first element and subsequently soldering the second element comprises the act of electrically connecting adjacent layers of the multiple layers through vias.

[c34] 34.The method of claim 30, wherein the act of soldering the first element comprises the act of connecting an ionizing photon detector tile to a semiconductor wafer.

[c35] 35.The method of claim of 34, wherein the act of connecting comprises the act of reflowing a plurality of solder bumps formed by the first material.

[c36] 36.The method of claim 35, wherein the act of reflowing comprises the act of creating interlayer electrical connections between the ionizing photon detector tile and the semiconductor wafer.

[c37] 37.The method of claim of 34, wherein the act of subsequently soldering the second element comprises the act of electrically connecting the semiconductor wafer to a circuit board.

[c38] 38.The method of claim 37, wherein the act of electrically connecting comprises the act of reflowing a plurality of solder bumps formed by the second material without disturbing the first material.

[c39] 39.A method for assembling detector tiles for an imaging system, comprising the acts of:
placing a detector tile on a die;
aligning a bump interconnect between the detector tile and the die; and
electrically connecting the detector tile to the die using the bump interconnect.

[c40] 40. The method of claim 39, wherein the act of placing the detector tile comprises the act of disposing an ionizing photon detector material on the die.

[c41] 41. The method of claim 39, wherein the act of placing the detector tile comprises the act of disposing a Cadmium-Zinc-Telluride material on the die.

[c42] 42. The method of claim 39, wherein the act of placing the detector tile comprises the act of disposing a Cadmium-Telluride material on the die.

[c43] 43.The method of claim 39, wherein the act of aligning the bump interconnect comprises the act of matching the bump interconnect on a die with the bump interconnect on a detector element of the detector tile.

[c44] 44.The method of claim 39, wherein the act of aligning the bump interconnect comprises the act of matching a plurality of bump interconnects with a plurality of detector elements of the detector tile.

[c45] 45.The method of claim 44, wherein the act of electrically connecting the detector tile to the die comprises the act of intermediately connecting the plurality of bump interconnects with the plurality of detector elements within a perimeter of the detector tile.

[c46] 46.The method of claim 39, wherein the act of electrically connecting the detector tile to the die comprises the act of reflow soldering the bump interconnect to a detector element of the detector tile.

[c47] 47.The method of claim 46, wherein the act of reflow soldering the bump

interconnect is performed at a temperature nondestructive of other elements of the detector tile and the die.

[c48] 48.The method of claim 39, comprising the acts of:
providing a plurality of detector/die tiles by performing the acts of placing, aligning, and electrically connecting;
bending a flexible panel to a curved shape;
attaching the plurality of detector/die tiles to the flexible panel in the curved shape; and
inversely bending the flexible panel to a desired shape to close gaps between the detector/die tiles.

[c49] 49.The method of claim 48, wherein the act of bending the flexible panel comprises the act of applying a pressure to at least one side of the flexible panel.

[c50] 50.The method of claim 48, wherein the act of attaching the plurality of detector/die tiles comprises the act of picking and placing each of the detector/die tiles onto the flexible panel in an edge-to-edge configuration having an undesirable gap between edges of one or more adjacent pairs of the detector/die tiles.

[c51] 51.The method of claim 48, wherein the act of inversely bending the flexible panel comprises the act of releasing a bending force applied to the flexible panel.

[c52] 52.The method of claim 48, wherein the act of inversely bending the flexible panel comprises the act of partially releasing the flexible panel to the desired shape, which has a relatively flatter curvature than the curved shape.

[c53] 53.The method of claim 48, comprising the act of attaching the plurality of detector/die tiles to a circuit board to form a multi-detector module.

[c54] 54.The method of claim 53, wherein the act of attaching the plurality of detector/die tiles comprises the act of forming intermediate connections between each of the plurality of detector/die tiles and the circuit board.

[c55] 55.The method of claim 54, wherein the act of forming the intermediate connections comprises the act of reflowing a solder bump-array between surfaces of the plurality of detector/die tiles and the circuit board.

[c56] 56.The method of claim 55, wherein the act of reflowing the solder bump-array comprises the act of heating the solder bump-array to a temperature nondestructive of the previously connected bump interconnect.

[c57] 57.The method of claim 53, wherein the act of forming intermediate connections comprises the act of extending the intermediate connections through vias in each die of the detector/die tiles.

[c58] 58.The method of claim 53, comprising the act of tiling a plurality of the multi-detector modules to a primary circuit board for the imaging system.

[c59] 59.The method of claim and 58, wherein the acts of attaching the plurality of detector/die tiles and tiling the plurality of multi-detector modules comprises the act of forming intermediate connections between each of the plurality of detector/die tiles and the circuit board and between each circuit board and the primary circuit board.

[c60] 60.The method of claim 59, wherein the act of forming the intermediate connections comprises the act of reflowing a plurality of inner-perimeter solder bumps.

[c61] 61.A method for assembling detector tiles for an imaging system, comprising the acts of:

disposing a plurality of detector modules on a substrate, each detector module comprising intermediate connections between a detector tile and a die;

aligning a plurality of bump interconnects and die vias at adjacent surfaces of each detector module and the substrate, each die via extending through the die; and

electrically connecting each detector module to the substrate using the plurality of bump interconnects and vias.

[c62] 62.The method of claim 61, wherein the act of disposing the plurality of

detector modules on the substrate comprises the acts of:

bending a flexible panel to a curved shape;

attaching the plurality of detector modules to the flexible panel in the curved shape; and

inversely bending the flexible panel to a desired shape to close gaps between the detector modules.

[c63] 63.The method of claim 62, wherein the act of bending the flexible panel comprises the act of applying a pressure to at least one side of the flexible panel.

[c64] 64.The method of claim 62, wherein the act of attaching the plurality of detector modules comprises the act of picking and placing each of the detector modules onto the flexible panel in an edge-to-edge configuration having an undesirable gap between edges of one or more adjacent pairs of the detector modules.

[c65] 65.The method of claim 62, wherein the act of inversely bending the flexible panel comprises the act of releasing a bending force applied to the flexible panel.

[c66] 66.The method of claim 62, wherein the act of inversely bending the flexible panel comprises the act of partially releasing the flexible panel to the desired shape, which has a relatively flatter curvature than the curved shape.

[c67] 67.The method of claim 61, wherein the act of electrically connecting each detector module to the substrate comprises the act of reflow soldering the plurality of bump interconnects at a temperature nondestructive of other detector elements and connections.

[c68] 68.The method of claim 61, wherein the acts of disposing, aligning, and electrically connecting comprise the act forming a multi-detector module.

[c69] 69.The method of claim 68, wherein the act of forming the multi-detector module comprises the act of using a direct conversion ionizing photon detector material for the detector tile.

[c70] 70.The method of claim 68, comprising the act of tiling a plurality of the multi-detector modules to a primary circuit board for the imaging system.

[c71] 71.The method of claim the 70, wherein the act of tiling the plurality of multi-detector modules comprises the act of creating a plurality of intermediate solder bump connections between the primary circuit board and each of the plurality of multi-detector modules.

[c72] 72.The method of claim 71, wherein the act of creating the plurality of intermediate solder bump connections comprises the act of reflow soldering the plurality of intermediate solder bump connections at a temperature nondestructive of other detector elements and connections.

[c73] 73.A method for assembling detector tiles for an imaging system, comprising the acts of:
overlapping edge portions of a plurality of detector modules at edge-based electrical connections at each adjacent module of the plurality of detector modules; and
removing overlapping image data from one detector module of each overlapping pair of the detector modules.

[c74] 74.The method of claim 73, wherein the act of overlapping edge portions comprises the act of shingling the plurality of detector modules to accommodate the edge-based electrical connections.

[c75] 75.The method of claim 73, wherein the act of removing overlapping image data comprises the act of retaining the overlapping image data from an active one detector module of each overlapping pair of the detector modules.

[c76] 76. The method of claim 73, wherein the act of removing overlapping image data comprises the act of discarding shadowed pixels.

[c77] 77. The method of claim 73, wherein the act of removing overlapping image data comprises the act of retaining partially shadowed pixels.

[c78] 78. The method of claim 77, wherein the act of retaining partially shadowed pixels comprises the act of combining the partially shadowed pixels with

adjacent retained pixels.

[c79] 79. The method of claim 73, comprising the act of shifting image data to correct for the overlapping image data.

[c80] 80. The method of claim 79, wherein the act of shifting image data comprises the act of realigning image pixel data.

[c81] 81.The method of claim 73, wherein the act of removing overlapping image data comprises the act of identifying active and inactive portions of each detector module of the plurality of detector modules.

[c82] 82.The method of claim 73, wherein the act of removing overlapping image data comprises the act of reconstructing an image from image data acquired by the plurality of detector modules.

[c83] 83.The method of claim 73, comprising the act of forming each module of the plurality of detector modules using a plurality of ionizing photon detector tiles.

[c84] 84.The method of claim 83, wherein the act of forming each module comprises the acts of:
bending a flexible panel to a curved shape;
coupling the plurality of ionizing photon detector tiles to the flexible panel in the curved shape; and
inversely bending the flexible panel to a desired shape to close gaps between the detector tiles.

[c85] 85.The method of claim 83, wherein the act of forming each module comprises the acts of:
coupling the plurality of ionizing photon detector tiles to a flexible panel;
bending the flexible panel to a desired curvature to close gaps between the ionizing photon detector tiles; and
fixing the ionizing photon detector tiles in the desired curvature.

[c86] 86.The method of claim 83, wherein the act of forming each module comprises the acts of:
producing a plurality of detector/wafer tiles by soldering each tile of the

ionizing photon detector tiles to a wafer using intermediate connections comprising a first solder material; and

subsequently soldering a circuit board to the plurality of detector/wafer tiles using a second solder material having a lower melting point than the first solder material.